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In the Claims

The following is a listing of the claims presently presented in this application.

Claims 1 –12 (canceled)

Claim 13 (new): An electrolyte solution for a metal-oxygen battery where oxygen is reduced at a cathode surface to produce O^{-2} or O_2^{-2} ions, the electrolyte comprising:

a lithium salt selected from the group consisting of $LiPF_6$, $LiBF_4$, $LiClO_4$, $LiC(SO_2CF_3)_3$, $LiN(SO_2CF_3)_2$, $LiO_3SCF_2CF_3$, $LiO_3SC_6F_5$, LiO_2CCF_3 , $LiP(C_6H_5)_4$, $LiCF_3SO_3$; and

a non-aqueous solvent comprises a material selected from the group consisting of dimethyl carbonante (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O_2 /cc at STP.

Claim 14 (new) A metal-oxygen battery where oxygen is reduced at a cathode to produce O^{-2} or O_2^{-2} ions, the battery comprising

a lithium metal-containing anode;

a cathode, for reducing the oxygen; and

an electrolyte solution of a lithium salt selected from the group consisting of $LiPF_6$, $LiBF_4$, $LiClO_4$, $LiC(SO_2CF_3)_3$, $LiN(SO_2CF_3)_2$, $LiO_3SCF_2CF_3$, $LiO_3SC_6F_5$, LiO_2CCF_3 , $LiP(C_6H_5)_4$, $LiCF_3SO_3$; and

a non-aqueous solvent for the electrolyte selected from the group consisting of dimethyl carbonante (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl

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methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O₂/cc at STP.

Claim 15 (new) The metal-oxygen battery of claim 14, wherein the electro-active cathode comprises carbon.

Claim 16 (new) A lithium-oxygen battery where oxygen is reduced at a cathode to produce O⁻² or O₂⁻² ions which react with lithium to produce Li₂O₂ and Li₂O that deposit on the cathode, the battery comprising

a lithium metal-containing anode;

a cathode, for reducing oxygen; and

an electrolyte solution of a lithium salt selected from the group consisting of LiPF₆,

LiBF₄, LiClO₄, LiC(SO₂CF₃)₃, LiN(SO₂CF₃)₂, LiO₃SCF₂CF₃, LiO₃SC₆F₅, LiO₂CCF₃,

LiP(C₆H₅)₄, LiCF₃SO₃; and

a non-aqueous solvent for the electrolyte selected from the group consisting of dimethyl carbonate (DMC), dipropyl carbonate (DPC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC), tetrahydrofuran (THF), and 1,2-dimethoxyethane (DME), wherein the oxygen solubility of the solvent is at least 0.1150 cc O₂/cc at STP.

Claim 17 (new) The metal-oxygen battery of claim 14, wherein the cathode comprises carbon.